

638. Water acidulated with sulphuric acid, solution of muriatic acid., solution of sulphate of soda, fused nitre, and the fused chloride and iodide of lead were not decomposed by this single pair of plates, excited only by dilute sulphuric acid.

639. These experiments give abundant proofs that a single pair of plates can electrolyse bodies and separate their elements. They also show in a beautiful manner the direct relation and opposition of the chemical affinities concerned at the two points of action. In those cases where the sum of the opposing affinities at x was sufficiently beneath the sum of the acting affinities in v , decomposition took place; but in those cases where they rose higher, decomposition was effectually resisted and the current ceased to pass (626).

640. It is, however, evident that the sum of acting affinities in v may be increased by using other fluids than dilute sulphuric acid, in which latter case, as I believe, it is merely the affinity of the zinc for the oxygen already combined with hydrogen in the water that is exerted in producing the electric current (654): and when the affinities are so increased, the view I am supporting leads to the conclusion that bodies which resisted in the preceding experiments would then be decomposed, because of the increased difference between their affinities and the acting affinities thus exalted. This expectation was fully confirmed in the following manner.

640. A little nitric acid was added to the liquid in the vessel

so as to make a mixture which I shall call diluted nitro-sulphuric acid. On repeating the experiments with this mixture, all the substances before decomposed again gave way, and much more readily. But, besides that, many which before resisted

electrolysis now yielded up their elements. Thus, solution of sulphate of soda, acted upon in the interstices of litmus and turmeric paper, yielded acid at the *anode* and alkali at the *cathode*; solution of muriatic acid tinged by indigo yielded chlorine at the *anode* and hydrogen at the *cathode*; solution of nitrate of silver yielded silver at the *cathode*.

Again, fused nitre and the fused iodide and chloride of lead were decomposable by the current of this single pair of plates, though they were not by the former (638),

641. A solution of acetate of lead was apparently

not decom-
posed by this pair, nor did water acidulated by
sulphuric acid
seem at first to give way (708).
642. The increase of intensity or power of the
current produced
by a simple voltaic circle, with the increase of the
force of the